BUILDING ENERGY SIMULATION

Volume 19 ¨ No 1 ¨ Spring 1998

For Users of DOE-2, SPARK, BLAST and their Derivatives

User News

What's New?

Life Beyond DOE-2.2?

Are you wondering what will happen to DOE-2 after DOE-2.2 is released this spring? Will the program continue to be supported? For how long? By whom? Will new features continue to be added? Here are the answers.

Through Lawrence Berkeley National Laboratory (LBNL), the U.S. Department of Energy (DOE) will support users who obtain DOE-2.2 from LBNL or DOE's Energy Science and Technology Software Center. (DOE-2.2 will also be available from other distributors, and those distributors will be responsible for supporting their customers.) DOE-2.2 will be maintained and bugs fixed by the authors--LBNL, J.J. Hirsch & Associates, and others.

LBNL will also benchmark and test new features developed by others before these are added to the standard release of DOE-2.2. This means that LBNL, along with DOE, will serve as the "keepers" of the official version of DOE-2.2.

We fully expect that new features will continue to be added to DOE-2.2. In fact, we know of two organizations that plan to add new modules and significant updates for future versions of DOE-2.2. However, DOE doesn't plan to have LBNL develop significant new features for DOE-2.2. As you have read here in the *User News*, LBNL is part of a team developing a new program, EnergyPlus. LBNL is now focusing its development strengths on EnergyPlus; ensuring that the features and capabilities that have made DOE-2 so popular are available in EnergyPlus. (At the same time, we are working to bring strengths from BLAST and other new capabilities into EnergyPlus, while eliminating some of the problem areas that are common to both programs.) We intend EnergyPlus to be the long-term replacement for DOE-2 (and BLAST); however, until EnergyPlus is released and adopted by a significant segment of users, we will continue to maintain and support our DOE-2 users.

Dru Crawley
Program Manager, Building Energy Tools
U. S. Department of Energy

Continued on p. 4

What's Inside?

The User News is published by the Simulation Research Group at Lawrence Berkeley National Laboratory with cooperation from the BLAST Support Office at the University of Illinois. Direct comments or submissions to Kathy Ellington, Editor, MS: 90-3147, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, or email kathy@gundog.lbl.gov or fax us at (510) 486- 4089. Direct BLAST- related inquiries to the BLAST Support Office, phone (217) 333-3977 or email support@blast.bso.uiuc.edu

This work was supported by the Assistant Secretary for Energy Efficiency and Renewable Energy, Office of Building Technology, State and Community Programs, Office of Building Systems of the U.S. Department of Energy, under Contract No. DE-AC03-76SF00098. Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory, University of California, Berkeley, CA 94720 USA

EnergyPlus™ Input – An Evolutionary Approach?

Linda K. Lawrie
Engineering Processes Division
U.S. Army Construction Engineering Research Laboratories

Remember?

It was the early 1970s. Mainframe computers abounded, but were difficult to access and expensive to use. Engineers had figured out that automation could make their difficult analysis jobs easier and less prone to computational errors. Fortran IV or Fortran 66 was the language of choice for most scientific applications. Computer Science was a recent addition to engineering disciplines.

Control Data Corporation (CDC) mainframe computers were being used in the scientific and engineering communities. The CDC machines and most others insisted that all entries be in UPPERCASE – computers weren't used for text processing!

"User friendly" wasn't in anyone's vocabulary. Most people using computers would or could write their own programs. And interfaces to most programs were cryptic, to say the least. Oriented around the 80-column punch card, numbers in specific columns were probably the closest thing to a "user interface".

DOE-2 and BLAST Input Structures

DOE-2 and BLAST each tried to break the mold of the cryptic interface to their simulation programs.

To quote from the *DOE-2 Users Guide*, Section 3, The Building Description Language: "Many programs require the input data to be punched onto data cards according to a strict and rigid format such as 'the night-time temperature set-point must be in columns 59-60 of the 15th card.' Such requirements are not only stringent, allowing little or no flexibility to the user, but also result in a deck of cards that is almost unintelligible to the user unless exact locations are memorized for each datum. The Building Description Language (BDL) has been developed to allow the designer to translate design concepts into a form the computer can recognize and to allow the designer to see easily what has been done. With very few exceptions the designer does not need to be concerned with what column of the card is being used and in every case the input data are labeled with recognizable words for easy identification."[1]

The *BLAST Users Manual* similarly states: "The BLAST program uses an unformatted, English-like input language which permits rapid inspection and easy interpretation of user-supplied input. Error detection and some automatic corrections assist in debugging the input file. While the input is unformatted, it does require proper syntax. In many cases the BLAST input language provides defaults which reduce the input required."[2]

Did any of us think that 20 years later we would still have the same basic inputs for each of these programs? While the number of engineers and users of computers has increased drastically over those 20 years, the number of people that can create new simulation models has certainly not grown at the same rate. And, I dare say, the number of people that can add new syntax to either DOE-2 or BLAST has probably remained the same (even perhaps the same people!).

Skip forward to 1998

The computing environment today is much different than 20 years ago. With the advent of the Personal Computer (circa 1981), computing became more open to all kinds of people. Today's computer users are no longer expected to be able to write programs for their computers (though many still can and new tools have made those tasks available to others). And, today's computer users expect much more from the software that they use. "User-friendly" is almost the minimum for people to be attracted to a new product. Fast, responsive, and online assistance is a must for new software. Written manuals are rarely (in my experience) read – the online assistance being easier to scan through.

[1] *DOE-2 Users Guide, Version 2.1, 1980*
[2] *BLAST Users Manual, Version 2.0, 1979*

Many of the same people who have worked with BLAST and DOE-2 over the years are now working to bring the simulation community a new simulation product, EnergyPlus. Representing over 100 years of experience in the energy analysis/simulation community, the collaborative efforts of the EnergyPlus team are creating the software that has been talked about previously in the Building Energy Simulation *User News*[1], on the EnergyPlus web site

http://www.eren. doe.gov/buildings/energy_tools/energyplus.htm

and in several international conferences. Highlights of the effort include modularization of the code, using standard Fortran 90 language features, and an emphasis on development that can be readily adapted or enhanced by others outside the EnergyPlus development team.

Learning from experience, we decided to concentrate on developing the "engine" of the simulation code and involve outside parties for the "user friendly" interfaces to the simulation.

But, EnergyPlus is software and where would software be without inputs and outputs? So, we devised a very simple structure for the inputs for EnergyPlus. Recognizing that many other programs may use the EnergyPlus engine, we have devised a simple, plain text format that can be produced by virtually any other piece of software.

There are two key elements to EnergyPlus input: the input data dictionary (often just called the IDD) and the input data file (IDF) which will drive the simulation.

EnergyPlus Input Data Dictionary

The input data dictionary (IDD), an example of which is shown in Fig. 1, is used to help the input processor properly interpret the incoming file. Basically, it defines the types of input data.

There are two types of items in the data dictionary: SECTIONS and OBJECTS. SECTIONS are used to partition the input data file into more readable sections. OBJECTS define the data for actual building components.
For each object, the Input Data Dictionary defines the "rules" for that object's data. Namely, the positions of each data item in the input and whether the data item is numeric or alpha.

As currently implemented, the only significant parts of the IDD are the SECTION and OBJECT names (ZONES, MATERIAL, etc.) and the nature of the data items ("A" for alpha or "N" for numeric). All other information is ignored by the input processor though it might be used in post-processing or general information to the users.

```
!SECTIONS  (sections have no "parameters")
Simulation Data;
ZONES;
SYSTEMS;
!OBJECTS
Location,A1 [Location Name],N1 [Latitude: validity: +N -S -90 to +90],
   N2 [Longitude: validity: +W -E -360 to +360],
   N3 [Time Zone: validity: 0 to 24: 0 correspond to -7.5 long to +7.5 long: GMT];
MATERIAL,A1 [Name],A2 [Type],A3 [Roughness],N1 [Thickness{M}],
   N2 [Conductivity{W/(M*K)}],N3 [Density{KG/M^3}],N4 [Specific Heat{KJ/(KG*K)}],
   N5 [Thermal Resistance{M^2*K/W}],N6 [Absorptance Thermal],
   N7 [Absorptance Solar],N8 [Transmittance],N9 [Transmittance Film],
   N10 [Shade Reflectance],N11 [IndexRefraction],N12 [ShadingCoeff],
   N13 [VaporDiffusivity{m^2/hr}],N14 [Porosity{m^2/m^2}],
   N15 [Thermal-Gradient Coeff for Moisture Capacity {kg/(kg*K)}],
   N16 [Isothermal moisture capacity {m^3/kg}];
```

Figure 1. Input Data Dictionary Example

Note that the ! character is used to represent comments. SECTIONS then shows what words will be included as "sections" in the input file (i.e. "Simulation Data" -- "End Simulation Data" pairs). Finally the OBJECTS will describe all the possible object lines (either all possible or all included in the particular input file).

The description fields shown (in the MATERIAL and LOCATION definitions) may be useful for new developers or people trying to read the source code. Note that semi-colons terminate the data dictionary objects because object definitions can span more than one "line".

[1] *"EnergyBase, the "Best of" DOE-2 and BLAST," User News, Vol. 17, No. 3, Fall 1996; "EnergyPlus, The Merger of BLAST and DOE-2," User News, Vol. 18, No. 4, Winter 1997.*

A major advantage of the IDD is that it is extensible. New SECTIONS or OBJECTS can be added without any changes to the input processor code.

EnergyPlus Input Data File

This is the file (Fig. 2) that all the routines will naturally use to get the data. It can be hierarchically structured (1 level) but the maintenance of the hierarchy will be the responsibility of the EnergyPlus code developers. The input processor needs to know nothing about the actual content of the data in each object, only whether it is alpha or numeric. So far, the team has gone the route of no hierarchical input and uses reference items (e.g. Zone Names, Surface Names, etc.) to preserve the inherent hierarchical nature of buildings (i.e. walls have windows, zones have walls, internal heat gains are in zones). This allows the input to be order independent but adds a burden to the developer if the data should be in some specific order for efficient processing.

Note in the example that numbers are very flexibly input. (All processed into single precision variables).

```
Lead Input;
  MATERIAL,  R13LAYER,  RegularMaterial,  Rough,   0,
  0,   0,   0,   2.29096500E+00, .9,   .75,   0,   0, 0,   0,   0,   0, 0,   0,   0;
  MATERIAL,  GLASS - CLEAR SHEET 1 / 8 IN,  RegularGlass,  VerySmooth,
 0,   0,   0,   0, 4.15898200E-03,   .9,   .75,   .87, 0,   0,   1.52,   0, 0,   0,   0,   0;
  MATERIAL,  B1 - AIRSPACE RESISTANCE,  Air,  Rough,   0,
 0,   0,   0,   1.60367500E-01, .9,   .75,   1.0,   0, 0,   1.0,   0,   0, 0,   0,   0;
End Lead Input;
```

Figure 2. Input Data File Example

Summary

We have tried to place fewer burdens on maintaining the input language for EnergyPlus than was implicit in both BLAST and DOE-2. So far, we have had good success with developers being able to create their own "syntax" for the input processor and successfully get the appropriate data into the right spots in the EnergyPlus program. This highlights one of the most important features of the input structure. Developers can add their syntax to the IDD, use the standard routines already written (and debugged) to retrieve their data after the input processor "parses" it, and use the resultant data in their models. Developers can do this without having to customize any part of the "parser", generate keyword tables, run separate programs or "mess" in parser code.

EnergyPlus is a trademark of the U.S. Department of Energy.

What's New ?? (continued)

¨ **Efficient Windows Website**

A new efficient windows website, sponsored by the US Dept. of Energy, provides unbiased information on the benefits of energy-efficient windows.

Go to www.efficientwindows.org

¨ **Update those Address Books**

Please note the new address and phone number for Bruce Birdsall, who provides DOE-2 user support.

Bruce Birdsall
825 Oak Grove Rd., #33
Concord, CA 94518
Phone / Fax: (925) 671-6942
(call before you fax)

Réne Meldem, DOE-2 consultant and head of our Swiss resource center, has a new address:

Réne Meldem
Meldem Energie SA
30 a ch. De la Fauvette
CH-1000 Lausanne 12
Switzerland
Tel: +41 21 653 8044
Fax:: +41 21 653 8054
meldem.energie@bluewin.ch

Continued on p. 22

Recent LBNL Reports

These reports are available from Pat Ross of the LBNL Building Technologies Program. Please fax your request to Pat at (510) 486-4089; be sure to include the LBNL number.

LBNL-40591

Building Design Advisor: Automated Integration of Multiple Simulation Tools*

by

K. Papamichael, J. LaPorta, and H. Chauvet
Lawrence Berkeley National Laboratory
Berkeley, CA 94720

Abstract

The building Design Advisor (BDA) is a software environment that supports the integrated use of multiple analysis and visual-ization tools throughout the building design process, from the initial, conceptual and schematic phases to the detailed specifi-cation of building components and systems. Based on a com-prehensive design theory, the BDA uses an object-oriented representation of the building and its context, and acts as a data manager and process controller to allow building designers to benefit from the capabilities of multiple tools.

The BDA provides a graphical user interface that consists of two main elements: The building Browser and the Decision Desktop. The Browser allows building designers to quickly navigate through the multitude of descriptive and performance parameters addressed by the analysis and visualization tools linked to the BDA. Through the Browser the user can edit the values of input parameters and select any number of input/ output parameters for display in the Decision Desktop. The Desktop allows building designers to compare multiple design alternatives with respect to multiple descriptive and perform-ance parameters addressed by the tools linked to BDA.

The BDA is implemented as a Windows-based application for personal computers. Its initial version is linked to a Schematic Graphic Editor (SGE), which allows designers to quickly and easily specify the geometric characteristics of building compo-nents and systems. For every object created in the SGE, the BDA activates a Default Value Selector (DVS) mechanism that selects "smart" default values from a Prototypes Database for all non-geometric parameters required as input to the analysis and visualization lools linked to the BDA. In addition to the SGE, an integral part of its user interface, the initial version of BDA is linked to a daylight analysis tool, an energy analysis tool, and a multimedia Web-based Case Studies Database (CSD). The next version of the BDA will be linked to analysis tools such as DOE-2 (for thermal, energy, and energy cost) and RADIANCE (for day/lighting and rendering). Plans for the future include the development of links to cost estimating and environmental impact modules, building rating systems, CAD software, and electronic product catalogs.

*Published in *Automation in Construction 6 (1997)* 342-352

LBNL-39729

Design and Performance of an Intgrated Envelope/Lighting System

by

E. S. Lee and S. E. Selkowitz
Lawrence Berkeley National Laboratory
Berkeley, CA 94720

Abstract

Dynamic envelope/lighting systems offer the potential to achieve a near-optimum energy efficient environment to meet occupant needs throughout the year by adapting to dynamic meteorological conditions and changing occupant preferences in real time. With the dramatic, increased functionality of the microprocessor, there is an untapped potential to make dynamic envelope lighting systems easier to use, diagnose, and monitor and to integrate them as part of a sophisticated building-wide control system. This study addresses the complex relationship between this energy-efficiency technology and many of the non-energy issues related to its potential acceptance by the building industry, architects, owners, and users. We demonstrate the concept of integrated dynamic systems with a prototype motorized Venetian blind operated in synchronization with electric lighting and daylighting controls via an intelligent controls system. Research work conducted with simulation software and reduced-scale/full-scale field tests is summarized. Much of this work is directly relevant to other active shading and daylighting systems on the market today and to state-of-the-art window systems yet to come (i.e., electrochromics).

Presented at the ICBEST '97 International Conference on Building Envelope Systems and Technology, 15-17 April 1997, University of Bath, UK, and published in the Proceedings.

Underground Surfaces

How to Get a Better Underground Surface Heat Transfer Calculation in DOE-2.1E

by
Fred Winkelmann
Simulation Research Group
Lawrence Berkeley National Laboratory

Underground surfaces in DOE-2.1E are walls or floors that are in contact with the ground. An example is a slab-on-grade or a basement wall. Underground surfaces are entered using the UNDERGROUND-WALL command, or the equivalent command, UNDERGROUND-FLOOR. Check the description of these commands in the *Reference Manual* for information on the keywords for these surfaces.

Heat Transfer

Care needs to be taken in describing the construction of an underground surface in order to get a correct calculation of the heat transfer through the surface and a correct accounting for the thermal mass of the surface, which is important in the weighting factor calculation for the space. In the LOADS program, DOE-2 calculates the heat transfer through the underground surface as

$$Q = UA(T_g - T_i)$$

where U is the conductance of the surface, A is the surface area, T_g is the ground temperature and T_i is the inside air temperature. *If the raw U-value of the surface is used in this expression the heat transfer will be grossly overcalculated.* This is because the heat transfer occurs mainly through the surface's exposed perimeter region (since this region has relatively short heat flow paths to the outside air) rather than uniformly over the whole area of the surface. For this reason, users are asked to specify an effective U-value with the U-EFFECTIVE keyword. This gives

$$Q = [U\text{-}EFFECTIVE]*A(T_g - T_i)$$

In general U-EFFECTIVE is much less than the raw U-value.

The following procedure shows how to determine U-EFFECTIVE for different foundation configurations. It also shows how to define an effective construction for an underground surface that properly accounts for its thermal mass when custom weighting factors are specified. The procedure assumes that the monthly ground temperature is the average outside air temperature delayed by three months, which is similar to how the ground temperatures on the weather file are calculated. To force the program to use the weather file values, do *not* enter ground temperatures using the GROUND-T keyword in the BUILDING-LOCATION command.

Procedure for defining the underground surface construction

1. Choose a value of the perimeter conduction factor, *F2*, from Table 1, 2 or 3 for the configuration that best matches the type of surface (slab floor, basement wall, crawl-space wall), foundation depth and amount/location of insulation.

2. Using *F2*, calculate R_{eff}, the *effective resistance* of the underground surface, which is defined by the following equation:

   $$R_{eff} = A / (F2 * P_{exp})$$

   where A is the area of the surface (ft^2 or m^2) and P_{exp} is the length (ft or m) of the surface's perimeter that is exposed to the outside air. Figures 1 and 2 show values of P_{exp} for example foundation configurations. If P_{exp} is zero**, set R_{eff} to a large value, e.g. R_{eff} = 1000.

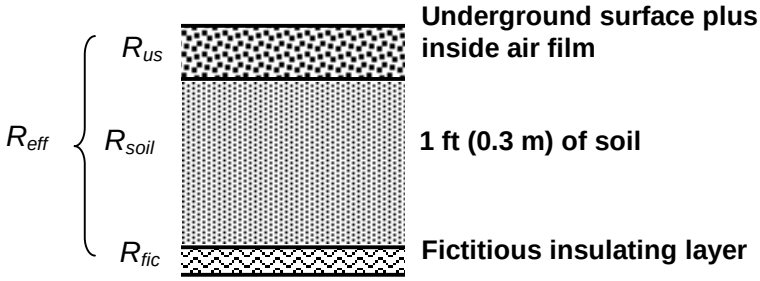
3. Set U-EFFECTIVE = $1/R_{eff}$.

   The program will calculate the heat transfer through the underground surface to be

   $$Q = [U\text{-}EFFECTIVE] * A (T_g - T_i)$$

4. Define a construction, shown in the figure below, consisting of the following:

   - The underground wall or floor, including carpeting, if present, and inside film resistance (overall resistance = R_{us})
   - A 1-ft (0.3-m) layer of soil (resistance = R_{soil} = 1.0 hr-ft^2-F/Btu [0.18 m^2-K/W])
   - A fictitious insulating layer (resistance = R_{fic})
   -



   The layer of a soil represents the thermal mass of the ground in contact with the underground surface (a 1-ft [0.3-m] layer is sufficient to account for most of the thermal mass effect). The fictitious insulating layer is required to give the correct effective resistance for the construction, i.e.

   $$R_{eff} = R_{us} + R_{soil} + R_{fic}$$

   From this we get

   $$R_{fic} = R_{eff} - R_{us} - R_{soil}$$

** The procedure makes the approximation that the heat transfer through an underground surface with no exposed perimeter, such as a basement floor, is zero.

The procedure for defining this construction is shown in the following example.

Example: 50' x 100' slab-on-grade.
The slab consists of uncarpeted, 4-in (10-cm) heavy-weight concrete (CC03 in the DOE-2.1E library), with resistance = 0.44 hr-ft^2-F/Btu (0.078 m^2-K/W). The foundation depth is 4 ft (1.22 m) with R-10 (1.76 m^2-K/W) exterior insulation, which gives F2 = 0.50 Btu/hr-F-ft (0.86 W/m-K) from Table 1. We then have:

Slab surface area:	A = 50x100 = 5000 ft^2
Slab exposed perimeter:	P_{exp} = (2x50) + (2x100) = 300 ft
Effective slab resistance:	$R_{eff} = A/(F2*P_{exp})$ = 5000/(0.68*300) = 33.3
Effective slab U-value:	U-EFFECTIVE = $1/R_{eff}$ = 0.030
Actual slab resistance:	R_{us} = 0.44 + R_{film} = 0.44 + 0.77 = 1.21
Resistance of fictitious layer:	$R_{fic} = R_{eff} - R_{us} - R_{soil}$ = 33.3 – 1.21 – 1.0 = 31.1

Here, 0.77 hr-ft^2-F/Btu (0.14 m^2-K/W) is the average of the air film resistance for heat flow up— 0.61 hr-ft^2-F/Btu (0.11 m^2-K/W)—and heat flow down— 0.92 hr-ft^2-F/Btu (0.16 m^2-K/W). For vertical surfaces, such as basement walls, you can use R_{film} = 0.68 hr-ft^2-F/Btu (0.12 m^2-K/W).

The input would look like:

```
$ Slab-on-grade $

MAT-FIC-1  = MATERIAL  RESISTANCE = 31.1  .. $ the Rfic value

SOIL-12IN = MATERIAL  THICKNESS = 1.0  CONDUCTIVITY = 1.0
                      DENSITY = 115  SPECIFIC-HEAT = 0.1 ..

LAY-SLAB-1 = LAYERS  MATERIAL = (MAT-FIC-1,SOIL-12IN,CC03)
                     INSIDE-FILM-RES = 0.77 ..

CON-SLAB-1 = CONSTRUCTION LAYERS = LAY-SLAB-1 ..
  .
  .
SLAB-1 = UNDERGROUND-FLOOR HEIGHT = 50
                           WIDTH = 100
                           TILT = 180
                           U-EFFECTIVE = 0.030
                           CONSTRUCTION = CON-SLAB-1 ..
```

Caution: If you change the dimensions of the slab later, be sure to recalculate R_{fic}. For example, if the 50x100-ft slab is changed to 50x80-ft exposed perimeter becomes 260-ft, and we get R_{eff} = 4000/(0.50*260) = 30.8 (rather than 33.3), U-EFFECTIVE = 1/30.8 = 0.033 (rather than 0.030), and R_{fic} = 30.8 – 1.21 – 1.0 = 28.6 (rather than 31.1).

Note (1):
For basements (Table 2) and crawl spaces (Table 3) an 8-in (20.3-cm) high section between ground level and the top of the underground wall is included in the F2 calculation and so does not have to be entered as a separate exterior wall. However, for shallow basements (Table 2) the wall section between the top of the underground wall and main level of the building should be entered as a separate exterior wall.

Note (2):
The floor of a crawl space (Table 3) should be entered as an UNDERGROUND-FLOOR consisting of a 1-ft (0.3-m) layer of soil with a fictitious insulation layer underneath it. Because the exposed perimeter of the floor in this case is zero, the heat transfer is zero, so the fictitious insulation layer should have a very high resistance and U-EFFECTIVE should be zero. The input would look like:

$ Crawl space floor $

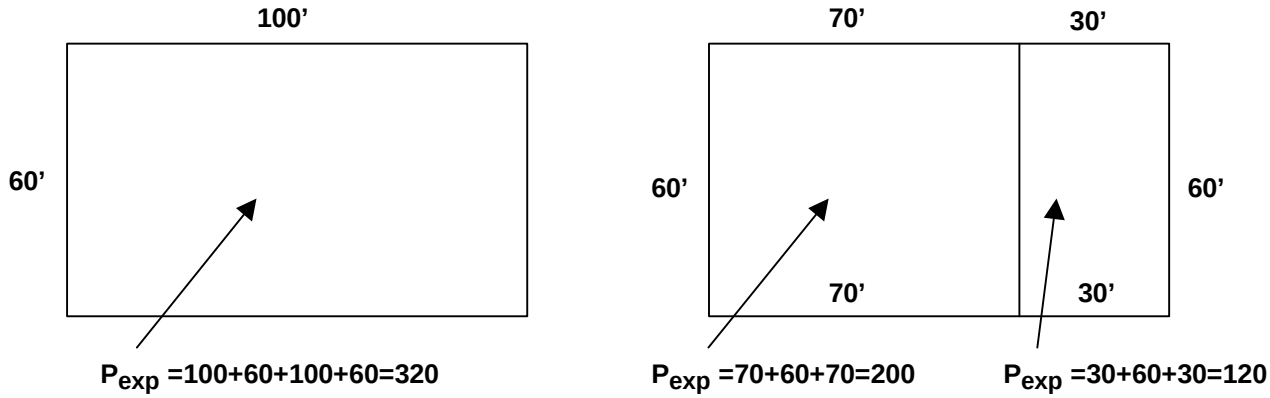
```
MAT-FIC-1  = MATERIAL RESISTANCE = 1000  ..

SOIL-12IN = MATERIAL  THICKNESS = 1.0
                      CONDUCTIVITY = 1.0
                      DENSITY = 115
                      SPECIFIC-HEAT = 0.1 ..

LAY-FLOOR-1 = LAYERS  MATERIAL = (MAT-FIC-1, SOIL-12IN)
                      INSIDE-FILM-RES = 0.77 ..

CON-FLOOR-1 = CONSTRUCTION LAYERS = LAY-FLOOR-1 ..
 ....

FLOOR-1 = UNDERGROUND-FLOOR HEIGHT = 50
                            WIDTH = 100
                            TILT = 180
                            U-EFFECTIVE = 0.0
                            CONSTRUCTION = CON-SLAB-1 ..
```

Thermal Mass

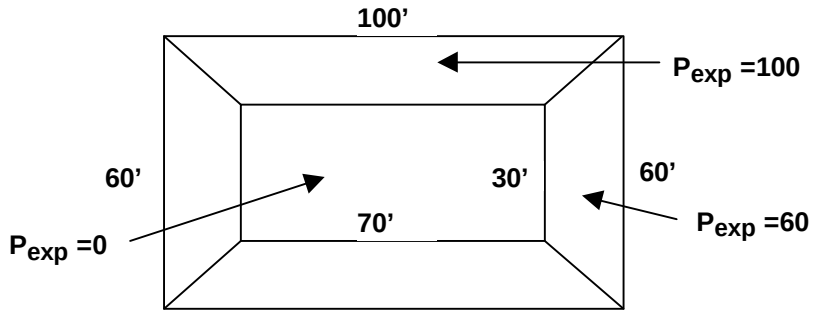
Underground surfaces are usually concrete and therefore have high thermal mass. Because of its heat storage capacity this mass attenuates loads due to heat gains (from lights, solar, people, etc.) and causes a time delay between when the heat gain occurs and when it appears as a load on the HVAC system. In general, the higher the heat capacity and the more closely coupled the mass is to the room air, the larger this delay and attenuation will be.

DOE-2 will account for thermal mass only if (1) the underground surface is entered with a layers-type construction, following the procedure described in the previous section; and (2) custom weighting factors are calculated for the space, i.e., FLOOR-WEIGHT = 0 in the SPACE or SPACE-CONDITIONS command.

Slab-On-Grade



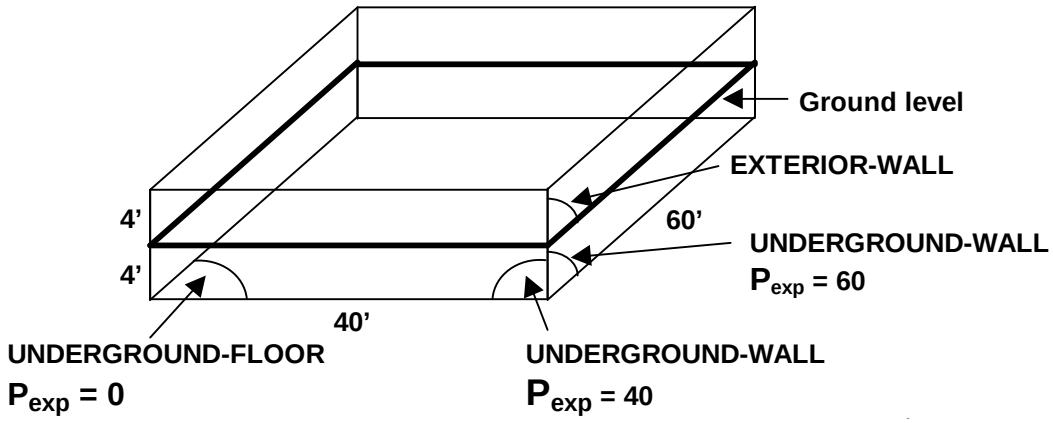
One zone **Two zones**



Five zones

Exposed perimeter calculation for slab-on-grade examples.

Basement



Exposed perimeter calculation for basement.

Table 1: Perimeter Conduction Factors for Concrete Slab-On-Grade*

Slab-On-Grade			
		PERIM-CONDUCT Btu/hr-F-ft (W/m-K)	
Foundation depth	Insulation Configuration (see sketch for location of insulation)	Uncarpetted	Carpetted
2 ft	Uninsulated	1.10 (1.90)	0.77 (1.33)
	R-5 exterior	0.73 (1.26)	0.54 (0.93)
	R-10 exterior	0.65 (1.12)	0.49 (0.85)
	R-5 interior; R-5 gap	0.75 (1.30)	0.57 (0.98)
	R-10 interior	0.89 (1.54)	0.46 (0.79)
	R-10 interior; R-5 gap	0.70 (1.21)	0.53 (0.92)
	R-10 interior; R-10 gap	0.68 (1.17)	0.52 (0.90)
	R-5 2-ft perimeter; R-5 gap	0.78 (1.35)	0.60 (1.04)
	R-10 2-ft perimeter; R-5 gap	0.73 (1.26)	0.57 (0.98)
	R-10 4-ft perimeter	0.79 (1.36)	0.59 (1.02)
	R-10 15-ft perimeter, R-5 gap	0.39 (0.67)	0.34 (0.59)
	R-5 16-in exterior, R-5 2-ft horizontal	0.65 (1.12)	0.48 (0.83)
	R-5 16-in exterior, R-5 4-ft horizontal	0.58 (1.00)	0.43 (0.74)
	R-10 16-in exterior, R-5 2-ft horizontal	0.56 (0.97)	0.41 (0.71)
	R-10 16-in exterior, R-5 4-ft horizontal	0.47 (0.81)	0.35 (0.60)
4 ft	Uninsulated	1.10 (1.90)	0.77 (1.33)
	R-5 exterior	0.61 (1.05)	0.46 (0.79)
	R-10 exterior	0.50 (0.86)	0.37 (0.64)
	R-15 exterior	0.44 (0.76)	0.33 (0.57)
	R-20 exterior	0.40 (0.69)	0.30 (0.52)
	R-5 interior; R-5 gap	0.63 (1.09)	0.48 (0.83)
	R-10 interior; R-5 gap	0.54 (0.93)	0.42 (0.73)
	R-15 interior; R-5 gap	0.50 (0.86)	0.38 (0.66)
	R-20 interior; R-5 gap	0.47 (0.81)	0.36 (0.62)
	R-5 4-ft perimeter; R-5 gap	0.68 (1.17)	0.54 (0.93)
	R-10 4-ft perimeter; R-5 gap	0.61 (1.05)	0.49 (0.85)
	R-10 4-ft perimeter	0.79 (1.36)	0.59 (1.02)
	R-10 15-ft perimeter, R-5 gap	0.39 (0.67)	0.34 (0.59)
	R-5 16-in exterior, R-5 2-ft horizontal	0.65 (1.12)	0.48 (0.83)
	R-5 16-in exterior, R-5 4-ft horizontal	0.58 (1.00)	0.43 (0.74)
	R-10 16-in exterior, R-5 2-ft horizontal	0.56 (0.97)	0.41 (0.71)
	R-10 16-in exterior, R-5 4-ft horizontal	0.47 (0.81)	0.35 (0.60)

*Source: Y.J.Huang, L.S.Shen, J.C.Bull and L.F.Goldberg, "Whole-House Simulation of Foundation Heat Flows Using the DOE-2.1C Program," ASHRAE Trans. 94 (2), 1988, updated by Y.J.Huang, private communication.

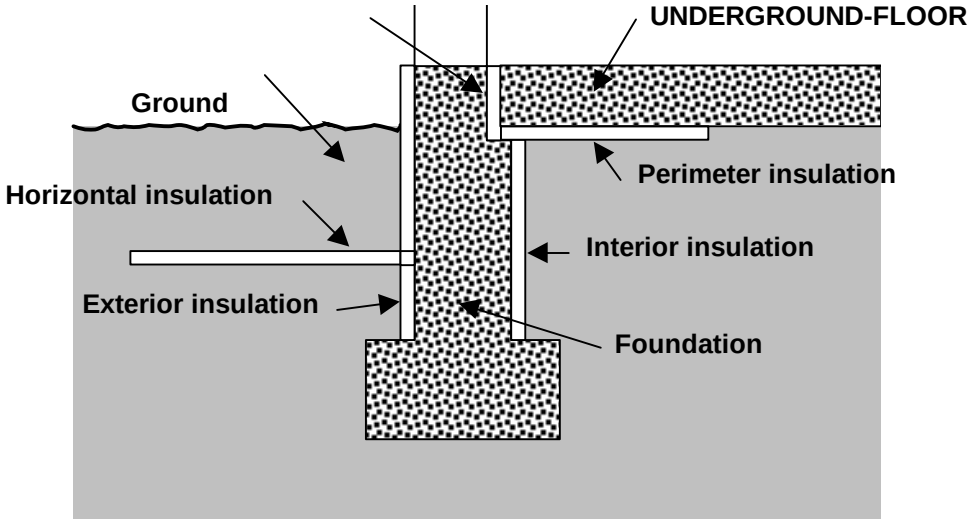


Table 2: Perimeter Conduction Factors for Basement Walls*

Basement Wall		
Underground Wall Height	**Construction (see sketch for location of insulation)**	**PERIM-CONDUCT Btu/hr-F-ft (W/m-K)**
8 ft (deep basement)	R-0 (uninsulated), concrete	1.94 (3.35)
	4-ft R-5 exterior, concrete	1.28 (2.21)
	8-ft R-5 exterior, concrete	0.99 (1.71)
	4-ft R-10 exterior, concrete	1.15 (1.99)
	8-ft R-10 exterior, concrete	0.75 (1.30)
	8-ft R-15 exterior, concrete	0.63 (1.09)
	8-ft R-20 exterior, concrete	0.56(0.97)
	8-ft R-10 interior, concrete	0.78 (1.35)
	R-0, wood frame	1.30 (2.25)
	R-11, wood frame	0.88 (1.52)
	R-19, wood frame	0.79 (1.37)
	R-30, wood frame	0.66 (1.14)
4 ft (shallow basement)	R-0 (uninsulated), concrete	1.61 (2.78)
	R-5 exterior, concrete	0.89 (1.54)
	R-10 exterior, concrete	0.73 (1.26)
	R-15 exterior, concrete	0.66 (1.14)
	R-20 exterior, concrete	0.65 (1.12)
	R-10 interior, concrete	0.79 (1.37)
	R-0, wood frame	1.10 (1.90)
	R-11, wood frame	0.80 (1.38)
	R-19, wood frame	0.74 (1.28)

*Source: Y.J.Huang, L.S.Shen, J.C.Bull and L.F.Goldberg, "Whole-House Simulation of Foundation Heat Flows Using the DOE-2.1C Program," ASHRAE Trans. 94 (2), 1988, updated by Y.J. Huang, private communication.

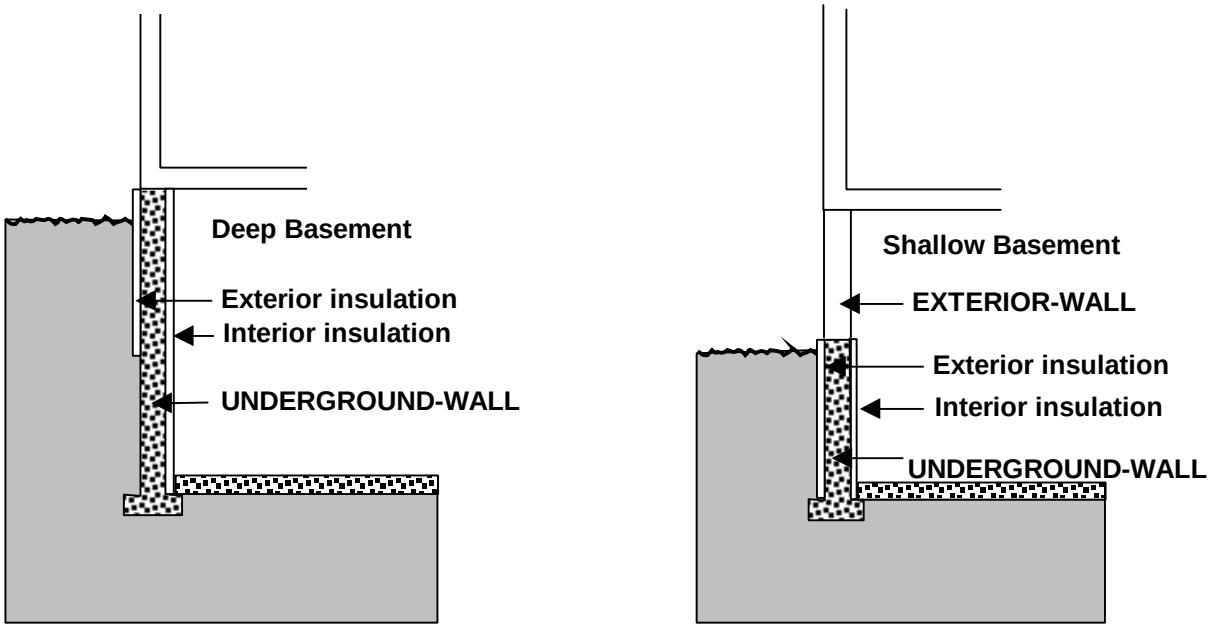
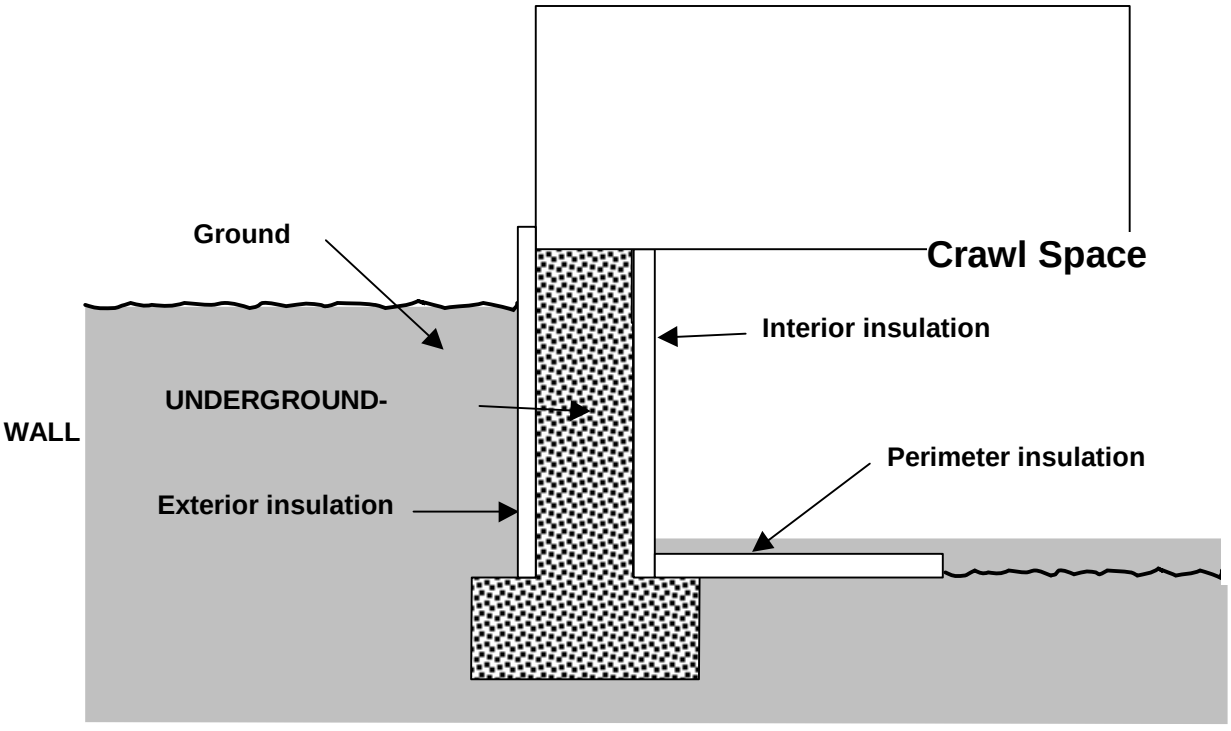


Table 3: Perimeter Conduction Factors for Crawl Space Walls*

Crawl Space Wall		
Wall Height	**Construction (see sketch for location of insulation)**	**PERIM-CONDUCT Btu/hr-F-ft (W/m-K)**
2 ft	R-0 (uninsulated), concrete	1.29 (2.23)
	R-5 exterior, concrete	0.93 (1.61)
	R-10 exterior, concrete	0.87 (1.95)
	R-5 interior, concrete	0.97 (1.50)
	R-10 interior, concrete	0.91 (1.57)
	R-5 interior; R-5 4-ft perimeter, concrete	0.73 (1.26)
	R-10 interior; R-10 4-ft perimeter, concrete	0.68 (1.18)
	R-0, wood frame	1.00 (1.73)
	R-11, wood frame	0.88 (1.52)
	R-19, wood frame	0.86 (1.49)
4 ft	R-0 (uninsulated), concrete	1.28 (2.21)
	R-5 exterior, concrete	0.71 (1.23)
	R-10 exterior, concrete	0.59 (1.02)
	R-15 exterior, concrete	0.54 (0.93)
	R-20 exterior, concrete	0.50 (0.86)
	R-5 interior; R-5 4-ft perimeter, concrete	0.64 (1.11)
	R-10 interior; R-10 4-ft perimeter, concrete	0.58 (1.00)
	R-0, wood frame	0.83 (1.44)
	R-11, wood frame	0.59 (1.02)
	R-19, wood frame	0.55 (0.95)

*Source: Y.J.Huang, L.S.Shen, J.C.Bull and L.F.Goldberg, "Whole-House Simulation of Foundation Heat Flows Using the DOE-2.1C Program," ASHRAE Trans. 94 (2), 1988, updated by Y.J. Huang, private communication.



Compare-IT from RLW Analytics, Inc.

Compare-IT is a Windows program whose graphical user interface (GUI) is built according to a DOE-2 input file's macro definitions. After *Compare-IT* commands are added to legacy DOE-2 models, *Compare-IT* reads the input file and builds the GUI. *Compare-IT* allows any DOE-2 macro definition to be available in an easy-to-use Windows interface. Value-entry text boxes with labels, tool tip definitions, units, minimum, maximum, and default values are all entered and transferred to the Windows interface (Fig. 1). Error checking is achieved with the minimum and maximum values obtained from the DOE-2 input files.

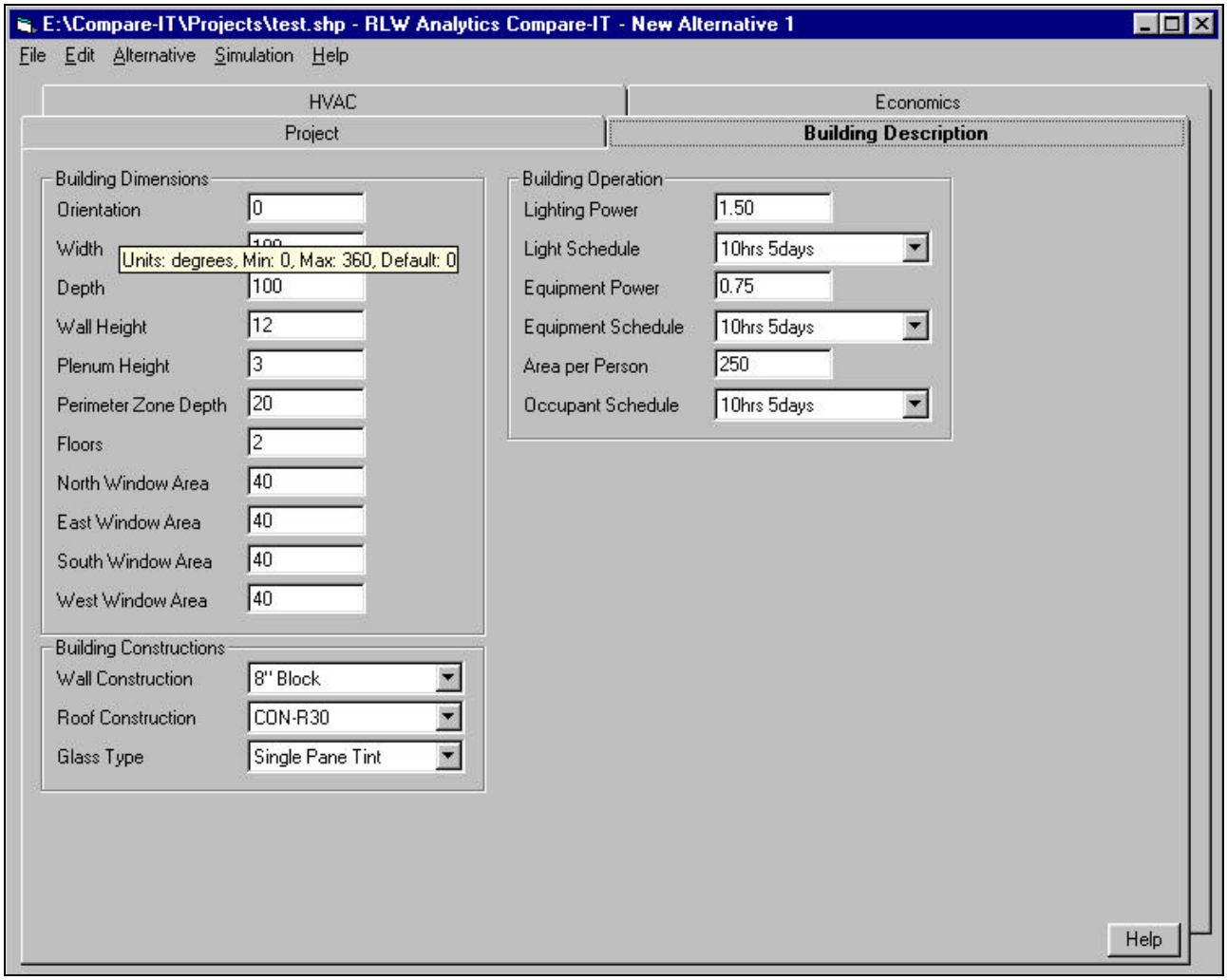


Figure 1: Interface built from a DOE-2 input file.

Drop-down list boxes are also enabled through *Compare-IT* commands; they are filed with items that are read from the DOE-2 input file along with a description for each item. The text boxes and drop-down list boxes can be organized in frames and tabs to create an intuitive interface. Help text is enabled for each tab section and can include anything, such as a explanation of the values and selections on that tab or standard values to use.

Through a seemingly-endless number of alternatives, *Compare-IT* can vary either a DOE-2 macro or an entirely new model or weather file.

Compare-IT automatically handles all DOE-2 files that are required and generated during a simulation run. The user has the option of leaving the individual input, BDL echo, for022 (sans macro text), output, and hourly report files on the computer or zipping or deleting them. If they are zipped, one zip file is created for each alternative containing the specified files, shown in Fig. 2.

Compare-IT automatically specifies and extracts end-use energy, energy costs, and hourly end-use data for the entire year. This data can be viewed for selected alternatives or exported to an Excel spreadsheet.

Compare-IT is an ideal tool for equipment manufacturers, building operators, utilities, and consulting firms to utilize DOE-2 through an easy to use and simple interface.

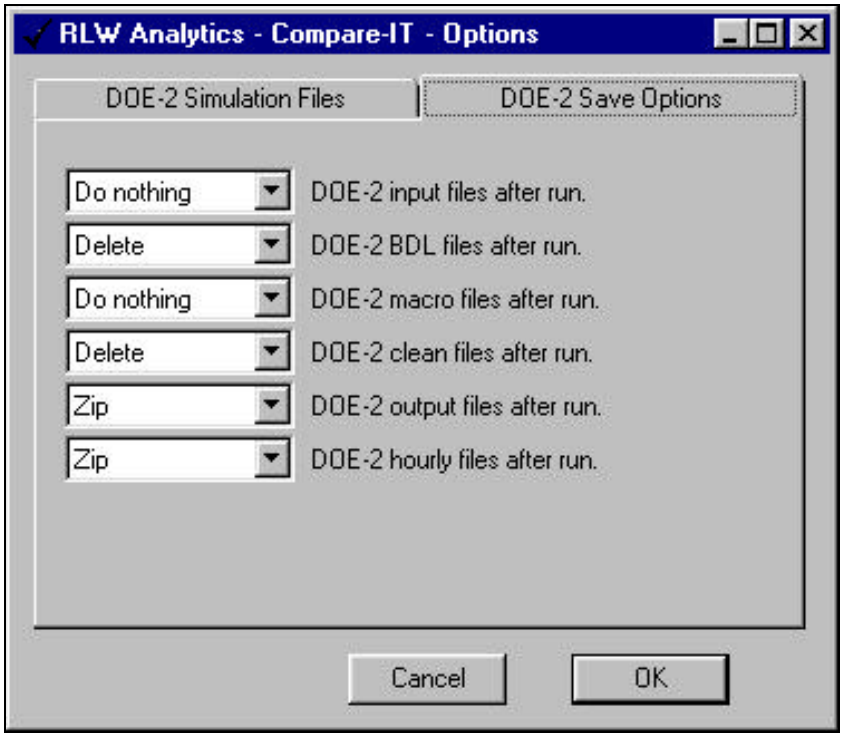


Figure 2: DOE-2 File Options.

Compare-IT displays the options the DOE-2 expert wants to make available to the novice program user using the language or jargon they choose.

Compare-IT requires Windows 95 or Windows NT 3.51 or later. *Compare-IT* will run any macro-enabled DOE-2.1*n* file as well as DOE-2.2.

RLW Analytics, Inc., 1055 Broadway, Sonoma, CA 95476 provides analytical, engineering, and market research consulting for utilities and private companies. See *User News*, Vol. 17, No. 2, for an article on their Visualize-IT Visual Data Analysis tools. For information, phone 707-939-8823, fax 939-9218, email info@rlw.com.

"Building Loads Analysis and System Thermodynamics"

blastnews

BLAST Support Office (BSO)

30 Mechanical Engineering Building
University of Illinois
1206 West Green Street
Urbana, IL 61801

Telephone: (217) 333-3977
FAX: (217) 244-6534
e-mail: support@blast.bso.uiuc.edu
http://www.bso.uiuc.edu

The **Building Loads Analysis and System Thermodynamics (BLAST)** system is a comprehensive set of programs for predicting energy consumption and energy system performance and cost in buildings. The BLAST system was developed by the U.S. Army Construction Engineering Research Laboratory (USACERL) under the sponsorship of the Department of the Air Force, Air Force Engineering and Services Center (AFESC), and the Department of the Army, Office of the Chief of Engineers (OCE). After the original release of BLAST in December 1977, the program was extended and improved under the sponsorship of the General Services Administration, Office of Professional Services; BLAST Version 2.0 was released in June 1979. Under the sponsorship of the Department of the Air Force, Aeronautical System Division, and the Department of Energy, Conservation and Solar Energy Office, the program was further extended; BLAST Version 3.0 was completed in September 1980. Since 1983, the BLAST system has been supported and maintained by the BLAST Support Office at the University of Illinois at Urbana-Champaign.

BLAST can be used to investigate the energy performance of new or retrofit building design options of almost any type and size. In addition to performing peak load (design day) calculations necessary for mechanical equipment design, BLAST also estimates the annual energy performance of the facility, which is essential for the design of solar and total energy (cogeneration) systems and for determining compliance with design energy budgets. Repeated use of BLAST is inexpensive; it can be used to evaluate, modify, and re-evaluate alternate designs on the basis of annual energy consumption and cost.

The BLAST analysis program contains three major subprograms:

- The Space Load Prediction subprogram computes hourly space loads in a building based on weather data and user inputs detailing the building construction and operation.
- The Air Distribution System Simulation subprogram uses the computed space loads, weather data, and user inputs describing the building air- handling system to calculate hot water, steam, gas, chilled water, and electric demands of the building and air-handling system.
- The Central Plant Simulation subprogram uses weather data, results of the air distribution system simulation, and user inputs describing the central plant to simulate boilers, chillers, on-site power generating equipment and solar energy systems; it computes monthly and annual fuel and electrical power consumption.

Heat Balance Loads Calculator (HBLC)
The BLAST graphical interface (HBLC) is a Windows-based interactive program for producing BLAST input files. HBLC allows the user to visualize the building model as it is developed and modify previously created input files. Within HBLC, each story of the building is represented as a floor plan which may contain several separate zones. Numerous other building details may be investigated and accessed through simple mouse operations. On-line helps provide valuable on-the-spot assistance that will benefit both new and experienced users. HBLC is an excellent tool which will make the process of developing BLAST input files more intuitive and efficient. You can download a demo version of HBLC (for MS Windows) from the BLAST website (User manual included!).
A FREE UPGRADE IS AVAILABLE to registered users, as of July 11. To obtain a password and instructions for downloading, e-mail to: support@blast.bso.uiuc.edu, or call (217) 333-3977. This upgrade may also be obtained by post for a nominal fee.

WINLCCID 97
LCCID (Life Cycle Cost in Design) has been a standard in the DoD community since its initial release in 1986. LCCID was developed to perform Life Cycle Cost Analyses (LCCA) for the Department of Defense and their contractors, yet it goes far beyond being just a DoD study tool by providing many features of a general purpose life cycle costing tool. With LCCID, it's easy to carry out "what-if" analyses based on variables such as present and future costs and/or maintenance and repair costs. LCCID allows an analysis based on standard DoD procedures and annually updated escalation factors as well as Energy Conservation Investment Program (ECIP) LCCA. You can download a demo version of WINLCCID 97 (for MS Windows) from the BLAST website.
[See *User News* Vol. 16, No. 4, p. 5].

To order BLAST-related programs, contact Kavon Pontius at the BLAST Support Office

BLAST Order Information

Program Name	Order Number	Price Each
PC BLAST Package The standard PC BLAST Package includes the following programs: BLAST, HBLC, BTEXT, WIFE, CHILLER, Report Writer, Report Writer File Generator, Comfort Report program, Weather File Reporting Program, Control Profile Macros for Lotus or Symphony, and the Design Week Program. A soft copy of the BLAST manual will be included as help files with the software. Executable version of BLAST Software Package for an IBM 386/486/Pentium.	3B386E3-0695	$950.00
PORTABLE BLAST (on DOS Formatted Disks) PC BLAST package plus FORTRAN source code	3BPORA3-0695	$1500.00
WINLCCID 97: executable version for 386/486/Pentium	3LCC3-0797	$295.00
WINLCCID 97: update from WINLCCID 96	4LCC3-0797	$195.00
BLAST 3.0 Documentation Set (Enter Quantity)		
Printed version in a 3-ring binder	1001-0695	$250.00

The last four digits of the catalog number indicate the month and year the item was released or published. This will enable you to see if you have the most recent version. All software will be shipped on 3.5" high density floppy disks unless noted otherwise.

DOE-2 Directory of Program Related Software and Services[1]

PC Versions of DOE-2

Program Name	Operating System	Description
ADM-DOE-2		Information not received from vendor 
DOE-PLUS Based on …  Demo: www.halcyon.com/byrne	DOS Windows (3.1, 95, NT)	Complete support for all DOE-2 commands. Imports BDL files created with a text editor or other program. Interactive error checking. 3-D view of building can be rotated and zoomed. 3-D view identifies windows, walls, etc., by DOE-2 U-name and allows component editing. User-defined libraries of schedules, HVAC systems, plant equipment, building components, etc. Exports results to spreadsheets and database programs. Graphical display of schedules. Utility programs included: Prep, Demand Analyzer, weather processor. On-line help. Over 500 worldwide weather files. *[See User News Vol. 11, No. 4, p. 4 and Vol. 13, No. 2, p. 54, and Vol. 16, No. 1, p. 28-32]*
EnergyPro Based on ESTSC[2] DOE-2.1E V. 092 Demo: www.energysoft.com	Windows (95, NT)	Performs nonresidential load calculations for HVAC equipment sizing. Produces typeset quality reports/forms. Electronically exports forms to AutoCad for inclusion on blueprints. On-line help. 344 weather files for the U.S. and Canada. For California Users: Performs Title 24 compliance calculations, includes state-certified HVAC and DHW Equipment directories, Title 24 tailored lighting calculations. *[See User News Vol. 18, Nos. 2, 4]*
EZDOE Based on J.J. Hirsch DOE-2.1D Demo: www.elitesoft.com	DOS	Provides full screen, fill-in-the-blank data entry, dynamic error checking, context-sensitive help, mouse support, graphic reports, a 750-page user manual, and extensive weather data. EZDOE integrates the full calculation modules of DOE-2 into a powerful, full implementation of DOE-2 on DOS-based 386 and higher computers. On-line help. Includes some weather files. *[See User News Vol. 14, No. 2, p. 10 and No. 4, p. 8-14]*
FTI/DOE Based on ESTSC[2] DOE-2.1E V. 092 No demo, 30-day trial period	DOS Windows (3.x, 95, NT) AIX, ULTRIX, VMS, Linux, NeXTStep,	FTI/DOE is 100% compatible with LBNL version. Highly optimized and extremely reliable. Version 3.1 will include a graphical user interface and will provide full command functionality and access to all reporting features of the original. Interface is Java-based and will be available for any system supporting Java. Source code versions will compile with most F77-compliant compilers. On-line help: Yes for Version 3.x, No for Version 2.x. 344 weather files for the U.S. and Canada. *[See User News Vol. 12, No. 4, p. 16]*
MICRO-DOE2 Based on ESTSC[2] DOE-2.1E V. 088 Demo: call vendor	DOS Windows (3.1, 95, NT)	Widely-used, reliable, and tested. Includes automatic weather processing, batch file creation, and a *Users Guide* with instructions on how to set up a RAM drive. System requirements: 386/486 PC with 4 MB of RAM and math co-processor. Optional BDL-Builder simplifies input (see "Pre- and Post-Processors for DOE-2). On-line help. Program includes some weather files. [See *User News* Vol. 7, No. 4, p. 2; Vol. 11, No. 1, p. 2; Vol. 15, No. 1, p. 8; Vol. 15, No. 3, p. 4; Vol. 16, No. 2, p. 1,7; Vol. 16, No. 4, p. 7-8]
PRC-DOE-2		Information not received from vendor 
VisualDOE2.6 Based on J.J. Hirsch DOE-2.1E, V. 083 Demo: www.eley.com	DOS Windows (3.1, 95, NT)	Dramatically faster construction of building geometry using pre-defined blocks and/or drawing interface. Import zone shapes from CADD file (dxf format). Point-and-click to define zone properties and HVAC systems. Define up to 20 design alternatives in each project file. View rotatable 3-D image of model. Create custom hourly output reports and customized graphs. Edit and expand library of constructions, schedules, equipment, and utility rates. Add custom performance curves. Network version allows sharing of libraries. On-line help. 400+ weather files for the U.S., 12+ weather files for Canada, plus selected locations around the world. *[See User News Vol. 15, No. 2, p. 10; Vol. 16, No. 4, p. 9-16; Vol. 17, No. 4, p. 8-13]*

[1] This information is based on a December 1997 survey of DOE-2 product vendors.
[2] Energy Science & Technology Software Center at Oak Ridge National Laboratory

DOE-2 Directory of Program Related Software and Services

PC Versions of DOE-2

Interface *Output*	Support	Program Price	Vendor Information
			ADM-DOE-2 (Marla Sullivan) 3239 Ramos Circle Sacramento, CA 95827 Ph: 916-363-8383 / Fx: 916-363-1788
Interactive, graphical, fill-in-the-blanks *Customizable tables and graphics*	Unlimited, except for DOE-2 modeling advice	$895 with DOE-2 and doc $495 without DOE-2 Source code not available.	**DOE-Plus (Steve Byrne)** Item Systems 321 High School Road NE #344 Bainbridge Island, WA 98110 Ph: 206-855-9540 / Fx: 206-855-9541 byrne @ item.com
Graphical *Graphs, forms*	Unlimited support	$1095 w/documentation Source code not available.	**EnergyPro (Demian Vonderkulen)** Gabel Dodd/EnergySoft 100 Galli Drive #1 Novato, CA 94949 Ph: 415-883-5900 / Fx: 415-883-5970 demian@energysoft.com
Fill-in-the-blanks *Standard DOE reports plus some custom graphic reports*	Unlimited phone support	$1295 w/documentation Source code not available.	**EZDOE (Bill Smith)** Elite Software P.O. Box 1194 Bryan, TX 77806 Ph: 409-846-2340 / Fx: 409-846-4367 bsmith @ elitesoft.com
Version 2.x: text based Version 3.x: graphical *All standard DOE-2 reports*	Free support for 90 days from date of purchase. After 90 days, support is: $35 email per incident $55 hour per incident $125 per hour for engineering advice. Bugs reports free.	$ 995.99 US w/documentation $1066 Int'l w/documentation $4999.99 source code	**FTI/DOE2 (Scott A. Henderson)** Finite Technologies Inc. 3763 Image Drive Anchorage, Alaska 99504 Ph: 907-333-8937 / Fx: 907-333-4482 info @ finite-tech.com
Fill-in-the-blanks *Run time and status graphics*	Assistance provided to install and initially use program. Reasonable support thereafter. Training available at Users office. Support price negotiated individually.	$500 w/documentation Source code available, call for price.	**MICRO-DOE2 (Don Croy)** Acrosoft/CAER Engineers 1204-1/2 Washington Avenue Golden, CO 80401 Ph: 303-279-8136 / Fx: 303-279-0506 102447.2611@compuserve.com
			PRC-DOE-2 (Paul Reeves) Partnership for Resource Conservation 140 South 34th Street Boulder, CO 80303 Ph: 430315-499-8611 / Fx: 303-554-1370 paulreeves@aol.com
Graphical *Summary tables, graphs, standard DOE-2.1E reports*	90 days free phone and email support. Support is $195 per year after first 90 days	$495 w/documentation Source code not available.	**VisualDOE2.6 (C. Eley or Erik Kolderup)** Charles Eley Associates 142 Minna Street San Francisco, CA 94105 Ph: 415-957-1977 / Fx: 415-957-1381 support@eley.com

Caveat : We list third-party DOE-2-related products and services for the convenience of program users, with the understanding that the Simulation Research Group does not have the resources to check the DOE-2 program adaptations and utilities for accuracy or reliability.

-

Pre- and Post-Processors for DOE-2[1]

Program Name	Description
BDL Builder **and** **E2BB**	**BDL Builder** is a user-friendly Windows-implemented pre-processor for DOE-2.1E that allows the description of specific building and HVAC characteristics with numeric input by preparing databases, or building blocks, and then selecting records from the databases to assemble a complete input. **E2BB** translates existing DOE-2.1E text input to **BDL Builder**.
DrawBDL	**DrawBDL,** Version 2.02, is a graphic debugging and drawing tool for DOE-2 building geometry. DrawBDL reads your BDL input and makes a rotatable 3-D drawing of your building with walls, windows, and building shades shown in different colors for easy identification. *[See User News, Vol. 14, No. 1, p. 5-7, Vol. 14, No. 4, p. 16-17, and Vol. 16, No. 1, p.37]*
Visualize-IT **Visual Data Analysis Tools**	The ***Energy Information Tool*** is a program for looking at and understanding metered or DOE-2.1E hourly output data. It provides the unprecedented ability to see all 8760 (or 35040) data points for a year's worth of data. You get an overview of the data with an EnergyPrint and can then explore the data with a variety of tools including load shapes, load duration curves, etc. This program requires a 486 or higher computer and SVGA graphics capabilities. The ***Calibration Tool*** is a program for comparing DOE-2.1E hourly output data to total load and/or end-use metered data. Options include monthly demand and load 2D graphs, maximum and seasonal load shapes, average load profiles, end use residuals, monthly average week and weekend days, and dynamic comparison load shapes. This program requires a 486 or higher computer and SVGA graphics capabilities. *[See User News Vol. 17, No. 2, p. 2-6]*
PRC-TOOLS	*Information not received from vendor* 

[1] This information is based on a December 1997 survey of DOE-2 product vendors.

Pre- and Post-Processors for DOE-2 (continued)

Operating System	Works with this version of DOE-2	Price	Vendor
Dos or Windows 3.1, 95	All 2.1E "stock" versions of the program	BDL Builder $750.00 E2BB $45.00	**MICRO-DOE2** **(Don Croy)** Acrosoft/CAER Engineers 1204-1/2 Washingtin Avenue Golden, CO 80401 Ph: 303-279-8136 / Fx: 303-279-0506 102447.2611@compuserve.com
	DOE-2.1E		**Joe Huang & Associates** 6720 Potrero Avenue El Cerrito, CA 91364 Ph/Fx: 510-236-9238
Windows 3.1	DOE-2.1E		**RLW Analytics, Inc.** **(Jim McCray** 1055 Broadway, G **Pat Bailey** Sonoma, CA 95476 **Jedd L. Parker)** Ph: 707-939-8823 Fx: 707-939-9218 Info@rlw.com www.rlw.com
			PRC-DOE-2 **(Paul Reeves)** Partnership for Resource Conservation 140 South 34th Street Boulder, CO 80303 Ph: 430315-499-8611 / Fx: 303-554-1370 paulreeves@aol.com

The Answer Man

Question In DOE-2, is it necessary to include explicit orientation information (X, Y, Z, AZIMUTH, TILT) for interior walls when studying daylighting?

Answer Only the TILT value is needed. It is used to determine whether the surface is a floor, wall or ceiling. This information is then used in the room interreflection calculation in the following way. Light moving upward through a window is reflected off of the ceiling and the upper part of walls. Light moving downward through a window is reflected off of the floor and the lower part of the walls.

This is the so-called "split-flux" calculation. It is crude since it neglects the X, Y, Z and azimuth of the surfaces. However, it gives a fairly good interreflected illuminance estimate for rectangular rooms with a depth less than three times floor to ceiling height.

TOOLS AND TRAINING

Building Energy Simulation User News **(a quarterly newsletter)** Sent without charge, the newsletter prints documentation updates and changes, bug fixes, inside tips on using the programs more effectively, and articles of special interest to users of DOE-2, BLAST, SPARK and their derivatives. The winter issue features an index of articles printed in all the back issues. Also available electronically at http://eande.lbl.gov/BTP/SRG/UNEWS	Simulation Research Group Bldg. 90, Room 3147 Lawrence Berkeley National Laboratory Berkeley, CA 94720 Contact: Kathy Ellington Fax: (510) 486-4089 kathy@srge.lbl.gov
Help Desk Bruce Birdsall Call or fax Bruce Birdsall if you have a DOE-2 problem or question. If you need to fax an example of your problem to Bruce, please be sure to telephone him prior to sending the fax. This is a free service provided by the Simulation Research Group at Lawrence Berkeley National Laboratory.	Bruce Birdsall Phone/Fax: (925) 671-6942 Monday through Friday 10 a.m. to 3 p.m. Pacific Time
Training DOE-2 courses for beginning and advanced users.	Marlin Addison Phone: (602) 968-2040 Maddiso@ix.netcom.com
Instructional DOE-2 Video and Manual Takes you step-by-step in DOE-2.1D input preparation and output interpretation.	Dr. Michael Brandemuehl, Director JCEM/U. Colorado CEAE Dept CB 428 Boulder, CO 80309-0428 Phone: (303) 492-3915, fax 492-7317

DOE-2.1E Bug Fixes via FTP

If you have Internet access you can obtain the latest bug fixes to the LBNL version of DOE-2.1E by anonymous ftp. Here's how…

ftp to either gundog@lbl.gov or to 128.3.254.10
login: *type* anonymous
passwd: *type in your e-mail address*

After logging on, go to directory pub/21e-mods ; bug fixes are in files that end with **.mod** . A description of the fixes is in file **VERSIONS.txt** in directory **pub** . Each fix has its own version number, ***nnn*** , which is printed out as DOE-2.1E- *nnn* on the DOE-2.1E banner page and output reports when the program is recompiled with the fix. You may direct questions about accessing or incorporating the bug fixes to Ender Erdem (ender@gundog.lbl.gov).

What's New ? (continued)

¨ Please welcome these new DOE-2 Consultants:

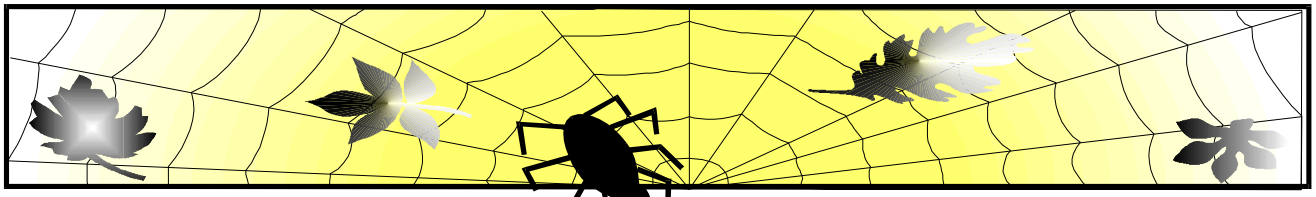
Marlin S. Addison
M. S. Addison & Associates
1215 West 12th Place
Tempe, AZ 85281
Tel: (602) 968-2040
msaddiso@ix.netcom.com

Dr. Malcolm Lewis, P.E.
Tom Lunneberg, P.E.
Constructive Technologies Group
16 Technology Drive, Suite 109
Irvine, CA 92618
TLunneberg@aol.com
Tel: (714) 790-0010, Fax: (714) 790-0020

David Pruitt and Scott Frank
Jaros, Baum & Bolles
80 Pine Street
New York, NY 10005
pruittd@jbb.com or franks@jbb.com
Tel: (212) 530-9300, Fax: (212) 269-5894

WEATHER RESOURCES

TMY2 weather data for DOE-2. ENERGOS will provide TMY2 data for 239 cities converted for use with DOE-2 for PC versions of the program (DOE-2.1C through DOE-2.1E).	Kurmit Rockwell ENERGOS 1705-14th Street, #401 Boulder, CO; 80302 Phone: (303) 499-7907 Fax: (303) 449-7605
Comprehensive collection of **TRY**, **TMY** and **CTZ** weather file libraries, from NCDC, which can be used on all PC versions of DOE-2. Includes original source data and pre-formatted packed versions on a single IBM format CD. Individual sites available.	Jenny Lathum or Martyn Dodd Gabel Dodd / EnergySoft, LLC 100 Galli Drive, Suite 1 Novato, CA 94949 Phone: (800) 467-4738 Fax: (415) 883-5970
European Weather Files	Andre Dewint Alpha Pi, s.a. rue de Livourne 103/12 B-1050 BRUXELLES, Belgium Phone: 32-2-649-8359 / Fax: 32-2-649-9437
TMY data sets - download from the World Wide Web **TMY2** data sets and **TMY2 User Manual** - download from the World Wide Web [See *User News* Vol. 18, no. 2, p. 17]	TMY: http//oipea-www.rutgers.edu/html_docs/TMY/tmy.html TMY2: http://rredc.nrel.gov/solar/
TMY (Typical Meteorological Year) **TRY** (Test Reference Year)	National Climatic Data Center 151 Patton Avenue, #120 Asheville, NC 28801 Phone: (704) 271-4871 order Fax 271-4876
CTZ (California Thermal Climate Zones)	California Energy Commission Bruce Maeda, MS-25 1516-9th Street Sacramento, CA 95814-5512 1-800-772-3300 Energy Hotline
WYEC (Weather Year for Energy Calculation)	ASHRAE 1791 Tullie Circle N.E. Atlanta, GA 30329 Phone: (404)636-8400 / Fax: (404)321-5478
Canadian Weather Files in WYEC2 Format [Note: the original long-term data sets, up to 40 years of data, from which the CWEC files were derived can also be obtained directly from Environment Canada. Contact Mr. Robert Morris at (416) 739-4361.]	Dr. Didier Thevenard Watsun Simulation Lab University of Waterloo Waterloo, Ont., N2L-3G1 Canada Phone: (519) 888-4904 Fax: (519) 888-6197 watsun@helix.watstar.uwaterloo.ca



World-Wide Web and Internet Sites for Building Energy Efficiency

The first two listings are newsgroups, not websites	
(net) sci.engr.heat-vent-ac	**HVAC** discussion group.
(net) sci.engr.lighting	**Lighting** discussion group.
These URLs, on the World-Wide Web, start with http://	
www.eren.doe.gov/buildings/ energy_tools/energyplus.htm/	**EnergyPlus** Information on EnergyPlus capabilities, structure, and development schedule. See *User News*, Vol. 17, No. 3; Vol. 18, No. 4, Vol. 19, No. 1, p.1, 25.
www.eren.doe.gov/buildings/ tools_directory/	**Building Energy Tools Directory** from theU.S. Department of Energy An electronic directory of software programs under four headings: Whole-Building Analysis, Codes and Standards, Materials/Components/Equipment/Systems, and Other Applications . See *User News*, Vol. 17, No. 4, p. 35.
www.bso.uiuc.edu	**BLAST** Support Office
www.energy.ca.gov/energy/cectext/ ETEC.html	**California Energy Commission's Energy Technology and Education Center**. See *User News* , Vol. 16, No. 1, p. 42.
www.hike.te.chiba-u.ac.jp/ikeda/ CIE/publ/110-94.html	**The International Commission on Illumination – CIE** See *User News* , Vol. 16, No. 1, p. 44.
www.eren.doe.gov/	**EREN**: Energy Efficiency and Renewable Energy Network of the U.S. Department of Energy . See *User News* , Vol. 16, No. 1, p. 44.
www.doe.gov/	**U.S. Department of Energy** . See *User News* , Vol. 15, No. 4, p. 1.
www.whitehouse.gov/	**The White House** home page contains an Interactive Citizens Handbook that lists U.S. Government servers by agency. Use this site as a jumping-off point to explore other Federal agencies. See *User News* , Vol. 15, No. 4, p. 1.
www.fedworld.gov/	**FedWorld** is the U.S. Government's Federal Information Network home page. It lists web servers, ftp, gopher, and telnet sites and is organized by subject categories. See *User News*, Vol. 16, No. 2, p. 22.
www.fedworld.gov/ntis/ntishome.html	**National Technical Information Service** NTIS gathers and markets scientific, technical and business-related information.
www.caddet-ee.org	**Center for the Analysis and Dissemination of Demonstrated Energy Technologies** An IEA program for collecting and disseminating information on, energy-efficient and renewable energy technologies. See *User News* , Vol. 16, No. 2, p. 23.
crest.org/aceee	**American Council for an Energy-Efficient Economy** A non-profit organization for the advancement of energy efficiency. See *User News* , Vol. 16, No. 2, p. 23.
www.ashrae.org	**American Society of Heating, Refrigeration and Air-Conditioning** An international membership organization for HVAC professionals. *User News* , Vol. 16, No. 3, p. 31.

www.cisti.nrc.ca/irc/irccontents.html	**[Canadian] Institute for Research in Construction** IRC is part of the NRC, Canada's premier science and technology agency. See *User News* , Vol. 16, No. 3, p. 31.
next1.mae.okstate.edu/ibpsa/	**International Building Performance Simulation Association** An international society of building performance simulation professionals. See *User News*, Vol. 16, No. 4, p. 35.
www.fsec.ucf.edu/	**Florida Solar Energy Center** State of Florida's energy institute specializing in energy research and education in partnership with private and public organizations. See *User News*, Vol. 17, No. 1, p. 29.
eande.lbl.gov/BTP/WDG/ **/RESFEN/resfen.html** **/SUPERLITE/superlite2.html** **/WDG.html**	**Fenestration software from LBNL** See *User News*, Vol. 17, No. 1, p. 14. **RESFEN-2.4** – calculates residential fenestration heating and cooling energy use/costs **SUPERLITE-2.0** – calculates daylight illuminance distributions for room geometries **WINDOW-4.1** – thermal analysis program to characterize window product performance
http://www.energy.ca.gov/reports/ title24/index.html	**State of California's Title 24 Building Energy Standards** See *User News*, Vol. 17., No. 2, p. 25.
fcn.state.fl.us/fdi/fdi-home.htm	**State of Florida's Design Initiative (FDI)** See *User News*, Vol. 17, No. 2, p. 25.
fcn.state.fl.us/fdi/edesign/online/edo.htm	***e-design,*** the online newsletter for Florida's Design Initiative See *User News*, Vol. 17, No. 2, p. 25.
www.energy.wsu.edu/ep/ **wsu.edu/ep/eic/** **wsu.edu/ep/eic/eicsoft.htm** **wsu.edu/ep/eic/eicfiles.htm**	The **Energy Program (EP)** of WSU. *User News*, Vol. 17, No. 3, p.26. **Energy Ideas Clearinghouse**, 925 Plum St S.E., Olympia, WA 98504-3171 Software and files from the Energy Ideas Clearinhouse More download-able energy software from the Energy Ideas Clearinhouse
eande.lbl.gov/CBS/VH/advisor.html	The **Virtual Home Energy Advisor** from LBNL's Center for Building science. Run a quick heating-cooling model and see how much homes in your region can save. See *User News*, Vol. 17, No. 3, p.26.
www.pge.com/customer_services/ other/pec/homepage/pec.html	Pacific Gas & Electric's **Energy Center** located in San Francisco, CA. See *User News*, Vol. 17, No. 4, p. 35
dial.uwaterloo.ca/~watsun/home.htm	**Watsun Simulation Laboratory** was established with the support of the National Research Council of Canada. Its mission is to develop general purpose simulation software for solar energy system simulation performance. See *User News*, Vol. 17, No. 4, p. 35.
WWW.CSEMAG.COM/	An online version of **Consulting-Specifying Engineer Magazine** See *User News*, Vol. 17, No. 4, p. 35.
www.homeenergy.org	**Home Energy Magazine** An impartial source to aid in making informed decisions on energy conservation measures. See the *User News*, Vol. 17, No. 1, p. 29 Vol. 17, No. 4, p.1.
eande.lbl.gov/BTP/BDA/BDA.html	The **Building Design Advisor** (BDA) is a software environment that supports the integrated use of multiple analysis and visualization tools throughout the building design process, from the initial, schematic design phases to the detailed specification of building components and systems. See the *User News*, Vol. 18, No. 4, p. 26.
http://sabu.weea.org	The **World Energy Efficiency Association** (WEEA) was founded in June 1993 as a private, non-profit organization composed of developed and developing country institutions and individuals charged with increasing energy efficiency. . See the *User News*, Vol. 18, No. 4, p. 26.

* * * Featured Sites This Issue * * *

World-Wide Web Sites for Building Energy Efficiency

Lighting Design Laboratory
www northwestlighting.com

The Lighting Design Lab in Seattle, Washington, provides assistance to commercial lighting designers seeking the most efficient lighting technologies and strategies. Sponsored by the Northwest Energy Efficiency Alliance, the Bonneville Power Administration and other electric utilities and energy organizations in Washington, Oregon, Idaho, Montana and British Columbia. The United States Department of Energy underwrites the cost of Lighting Design Lab services to Federal facilities in Alaska and Hawaii, as part of the Federal Energy Management Program (FEMP).

The Lighting Design Lab offers:

•Classes and events
•A Daylighting Laboratory
•Product demonstrations, information and displays
•A 1,200 square foot mock-up facility
•Lighting consultations
•Newsletter

Lighting Design Lab
400 E. Pine Street, Suite 100
Seattle, Washington 98122

Tel: 800-354-3864 (AK, BC, ID, HI, MT, OR, WA)
Fax: 206-329-9532

EnergyPlus™ Program
www.eren.doe.gov/buildings/energy_tools/energyplus.htm

EnergyPlus is a new generation building energy simulation program that builds on the best features and capabilities of BLAST and DOE-2. EnergyPlus will include innovative simulation capabilities including time steps of less than an hour, built-in template and external modular systems simulation modules that are integrated with a heat balance-based zone simulation, and input and output data structures tailored to facilitate third party interface development. Other planned simulation capabilities include multizone air flow, and electric power simulation including photovoltaic systems and fuel cells.

EnergyPlus is currently under development--an 'alpha' version is being tested by the development team. 'Beta' versions should be available later this year. Check this site and the *Building Energy Simulation User News* for announcements of beta versions availability.

This web site will be revised regularly to provide up-to-date information on EnergyPlus including documentation, schedules, and other information.

of California.

DOE-2 ENERGY CONSULTANTS

Arizona				
Marlin S. Addison	M. S. Addison & Associates	1215 West 12th Place	Tempe, AZ 85281	(602) 968-2040
Chuck Sherman	Energy Simulation Specialists	64 East Broadway, #230	Tempe, AZ 85282	(602) 784-4500
Sarat Kanaka	EcoGroup, Inc., Suite 301	2085 E. Technology Circle	Tempe, AZ 85284	(602) 777-3000
California				
George Marton	1129 Keith Avenue		Berkeley, CA 94708	(510) 841-8083
Jeff Hirsch	James J. Hirsch Associates	12185 Presilla Road	Camarillo, CA 93012	(805) 532-1045
Leo Rainer	Davis Energy Group, Inc.	123 C Street	Davis, CA 95616	(916) 753-1100
L. Heshong, D. Mahone	The Heshong Mahone Group	11622 Fair Oaks Blvd, #111	Fair Oaks, CA 95628	(916) 962-7001
Steven D. Gates, P.E.	11608 Sandy Bar Court		Gold River, CA 95670	(916) 638-7540
Tom Lunneberg, P.E.	Constructive Tech. Group	16 Technology Dr., #109	Irvine, CA 92618	(714) 790-0010
David J. Schwed	Romero Management Assoc	1805 West Avenue K	Lancaster, CA 93534	(805) 940-0540
Robert E. Gibeault	A-TEC	5515 River Avenue, # 301	Newport Beach, CA 92663	(714) 548-6836
Martyn C. Dodd	Gabel Dodd/EnergySoft, LLC	100 Galli Drive, # 1	Novato, CA 94949	(415) 883-5900
Robert Mowris, P.E.	10 Ridge Road		Orinda, CA 94563	(925) 254-9770
Greg Cunningham	EnerSys Solutions LLC	114 Sansome St., #1201	San Francisco, CA 94104	(415) 296-9760
Charles Eley	Eley Associates	142 Minna Street	San Francisco, CA 94105	(415) 957-1977
Chandra Shinde, P.E.	ENVIRODESIGN GROUP	385 S. Lemon Ave., E-266	Walnut, CA 91789	(909) 598-1980
Colorado				
David A. Cohen	Architectural Energy Corp	2540 Frontier Ave, #201	Boulder, CO 80301	(303) 444-4149
Kurmit Rockwell	Rocky Mtn Energy Services	1705 14th Street, # 401	Boulder, CO 80302	(303) 499-7907
Paul Reeves	PRC	140 South 34th Street	Boulder, CO 80303	(303) 499-8611
Ellen Franconi	P.O. Box 1284		Boulder, CO 80306	(303) 786-7319
Charles Fountain	Burns & McDonnell	8055 E. Tufts Avenue, #330	Denver, CO 80230	(303) 721-9292
Susan Reilly	Enermodal Engineering	1554 Emerson Street	Denver, CO 80218	(303) 861-2070
Donald E. Croy	Acrosoft/CAER Engineers	814 Eleventh Street	Golden, CO 80401	(303) 279-8136
Joel Neymark, P.E.	2140 Ellis Street		Golden, CO 80401	(303) 384-3672
Norm Weaver	Interweaver Consulting	P.O. Box 775444	Steamboat Spgs, CO 80477	(970) 870-1710
Connecticut				
Adrian Tuluca	Steven Winter Associates	50 Washington Street	Norwalk, CT 06854	(203) 852-0110
Florida				
Philip Wemhoff	1512 South McDuff Avenue		Jacksonville, FL 32205	(904) 632-7393
Dr. Paul Hutchins PE,CEM	Reynolds Smith & Hills, Inc.	4651 Salisbury Road	Jacksonville, FL 32256	(904) 279-2277
Georgia				
Lung-Sing Wong	Building Performance Engrs.	1351 Oakbrook Dr., #100	Norcross, GA 30093	(770) 409-0400
Illinois				
Michael P. Doerr	Skidmore Owings Merrill	224 S Michigan Ave # 1000	Chicago, IL 60604	(312) 360-4623
Gary H. Michaels, P.E.	G.H. Michaels Associates	1512 Crain Street	Evanston, IL 60202	(847) 869-5859
Prem N. Mehrotra	General Energy Corp.	230 Madison Street	Oak Park, IL 60302	(708) 386-6000
Robert Henninger, P.E.	GARD Analytics, Inc.	1028 Busse Highway	Park Ridge, IL 60068-1802	(847) 698-5686
Kansas				
Dr. Brian A. Rock, P.E.	A/E Dept, Marvin Hall	University of Kansas	Lawrence, KS 66045-2222	(785) 864-3603
Missouri				
Mike Roberts	Roberts Engineering Co.	11946 Pennsylvania	Kansas City, MO 64145	(816) 942-8121
Bruce A. Leavitt, P.E.	Wm. Tao & Associates Inc.	2357-59th Street	St. Louis, MO 63110	(314) 644-1400
Montana				
Michael W Harrison, P.E.	Harrison Engineering	139 Bluebird Lane	Whitehall, Montana 59759	(406) 287-5370
New York				
J. Fireovid, K. Yousef	SAIC Energy Solutions Div.	1 Marcus Boulevard	Albany, NY 12205	(518) 458-2249
H. Henderson, S. Carlson	CDH Energy Corporation	P.O. Box 641	Cazenovia, NY 13035	(315)-655-1063
Dave Pruitt, Scott Frank	Jaros, Baum & Bolles	80 Pine Street	New York, NY	(212) 530-9300
North Carolina				
Hank Jackson, P.E.	P.O. Box 675		Weaverville, NC 28787-0675	(704) 658-0298
Oregon				
J. Karasaki PE, R. Ogle PE	CBG Consulting Engineers	6650 SW Redwood Lane, #355	Portland, OR 97224	(503) 620-3232
Texas				
Jeff S. Haberl	Energy Systems Laboratory	Texas A&M University	College Stn., TX 77843-3123	(409) 845-6065
Washington				
Steve Byrne	ITEM Systems, suite 344	321 High School Road NE	Bainbridge Island, WA 98110	(206) 855-9540
Gregory Banken, P.E.	Q-Metrics, Inc.	P.O. Box 3016	Woodinville, WA 98072	(205) 915-8590

DOE-2 RESOURCE CENTERS

The people listed here have agreed to be primary contacts for DOE-2 program users in their respective countries. Each resource center has the latest program documentation, all back issues of the User News, and recent LBNL reports pertaining to DOE-2. These resource centers will receive copies of all new reports and documentation. Program users can then make arrangements to get photocopies of the new material for a nominal cost. We hope to establish resource centers in other countries; please contact us if you are interested in establishing a center in your area.

Australia

Murray Mason, ACADS BSG, 16 High Street, Glen Iris VIC. 3146, Australia
Tel: (61) 885 6586 / Fax: (61) 885 5974

Australasia

Dr. Deo K. Prasad/P. C. Thomas, SOLARCH, University of New South Wales, P.O. Box 1, Kensington, N.S.W. 2033, Australia
PC.Thomas@unsw.EDU.AU / Tel: (61)-2-9311-7136 (P.C. Thomas) / Fax: (61) 2-9662-1378

Germany

B. Barath or G. Morgenstern, Ingenieurbüro Barath & Wagner GmnH, Postfach 20 21 41, D-41552 Kaarst,
Germany Tel: (0049) 2131 75 74 90 12 G. Morgenstern / Fax: (0049) 2131 75 74 90 29

Hong Kong, China, Taiwan, Japan and Korea

Dr. Sam Chun-Man HUI or K.P. Cheung, Department of Architecture, The University of Hong Kong, Pokfulam Road, Hong Kong (SAR), CHINA
cmhui@hku.hk / http://arch.hku.hk/research/BEER/DOE-2/DOE-2.htm
Tel: (852) 2123 (direct to Sam Hui) / Fax: (852) 2559-6484 / Hui pager 7116 3808 a/c 1830

New Zealand

Tan Yune, Architecture Department, The University of Auckland, Private Bag 92019, Auckland, New Zealand
tanyune@ccu1.auckland.ac.nz / Tel: 64-9-373-7999 x5647 / Fax: 64-9-373-7410

Portugal, Spain, Italy, and Greece

Antonio Rego Teixeira, ITIME, Unidade de Energia, Estrada do Paco do Lumiar, 1699 Lisboa, Portugal
itime.ue@mail.telpac.pt / Tel: (351) 1-716-4096 / Fax: (351) 1-716-4305

Singapore, Malaysia, Indonesia, Thailand, and the Philippines

WONG Yew Wah, Raymond, Nanyang Technological University, School of Mechanical and Production Engineering, Nanyang Avenue, Singapore 2263, Republic of SIngapore,
mywwong@ntuvax.ntu.ac.sg / Tel: (65)799-5543 / Fax: (65)791-1859

South Africa

Prof. L. J. Grobler, School of Mechanical and Materials Engineering, University of Potchefstroom, Private Bag X6001, Potchefstroom 2520, South Africa
mgiljg@puknet.puk.ac.za / Tel: (27 148) 299 1328 / Fax: (27 148) 299 1320

South America

Prof. Roberto Lamberts,Universidade Federal de Santa Catarina, Campus Universitario-Trindade, Cx. Postal 476, 88049 Florianopolis SC, BRASIL lamberts@ecv.ufsc.BR / Tel: (55)482-31-9272 / Fax: (55)48-231-9770

Switzerland

René Meldem, Meldem Energie, SA 30 a ch. de la Fauvette, CH-1000 Lausanne 12, Switzerland
meldem.energie@bluewin.ch / Tel: +41 21 653-8044 / Fax: +41 21 653-8054

INTERNATIONAL DOE-2 ENERGY CONSULTANTS

Belgium

Andre Dewint, rue de Livourne 103/12, B-1050 BRUXELLES Belgium

Canada

Curt Hepting, P.Eng. EnerSys Analytics, 2989 Delahaye Drive, Coquitlam, B.C. V3B 6Y9 Canada enersys@infoserve.net / www.enersys.bc.ca/homepage

Dejan Radoicic, D. W. Thomson Consultants, Ltd., 1985 West Broadway, Vancouver, BC V6J 4Y3, Canada

Neil A. Caldwell, P.E., Tescor Pacific Energy Services, Inc., 1730 - 401 W. Georgia St., Vancouver, BC V6B 5A1 Canada caldwell@tescor.dwg.com / http://www.dwg.com/tescor

Stephane Bilodeau, P.E., Groupe Enerstat, Inc., 79 Wellington N. #202, Sherbrooke (Quebec) J1H 5A9, Canada bill@aramis.gme.usherb.ca / Tel: (819) 562-8040 / Fax (819) 562-5578

Germany

Jens Grundt and Ludwig Michel, GMW-Ingenieurburo, Vahrenwalder Str. 7, D-30165 Hannover, Germany, GMW-Ing.buero@t-online.de / Tel: 0049-511 9357440/Fax 0049-511-935744

New Zealand

Paul Bannister Energy Group, Ltd., 14a Wickliffe Street (P.O. Box 738), Dunedin New Zealand eglstaff@earthlight.co.nz

Switzerland

René Meldem, Meldem Energie SA, 30 a ch. de la Fauvette, CH-1000 Lausanne 12, Switzerland Meldem.energie@bluewin.ch / Tel: +41 21 653-8044 / Fax: +41 21 653-8054

Philip Schluchter, Institut fur Bauphysik Klein, Urs Graf-Strasse 1, CH4052 Basel, Switzerland

Gerhard Zweifel, Zentralschweizerisches Technikum Luzern (ZTL), Abt. HLK, CH-6048 Horw, Switzerland gzweifel@ztl.ch

Joerg Tscherry, Building Equipment Section 175, EMPA, 129 Überlandstrasse, CH-8600 Dübendorf, Switzerland

b*eta* release of LBNL's Building Design Advisor

The Building Design Advisor (BDA) is an advanced, Windows-based decision-making tool intended to help architects and engineers design more energy-efficient, economic, and comfortable buildings. The program can be downloaded from http://kmp.lbl.gov/BDA/beta_download.htm and users are encouraged to submit comments, suggestions, and bug reports to K_Papamichael@lbl.gov.

BDA version 1.0 is linked to a Schematic Graphical Editor, a daylighting simulation tool, and an energy simulation tool. Future BDA releases will be linked to additional simulation tools, including DOE-2, the de facto standard for building energy analysis, RADIANCE, a sophisticated day/lighting simulation program with photo-accurate rendering capabilities, and COMIS, a software tool for modeling airflow and indoor air quality.

For additional information on BDA, please contact

Kostas Papamichael
Lawrence Berkeley National Laboratory
MS: 90-3111
Berkeley, CA 94720
USA

Email: K_Papamichael@lbl.gov
Tel: (510) 486-6854
Fax: (510) 486-4089
http://eande.lbl.gov/BTP/KOSTAS.html

Meetings, Conferences, Symposia

ACEEE 1998 Summer Study on Energy Efficiency in Buildings

To be held
August 23-28, 1998
Asilomar Conference Ctr
Pacific Grove, California

For further information:
ACEEE
1001 Connecticut Avenue NW
#801
Washington, DC 20036

Tel: 202.429.8873
Fax: 202.429-0193
ace3-Cont@ccmail.pnl.gov

Green Building Challenge '98

To be held
October 26-28 , 1998
Vancouver, British Columbia

For further information:
Darinka Tolot
GBC 98
Conference Secretariat
CANMET Energy Tech Ctr
580 Booth St., 13th Floor
Ottawa, ON K1A 0E4
CANADA

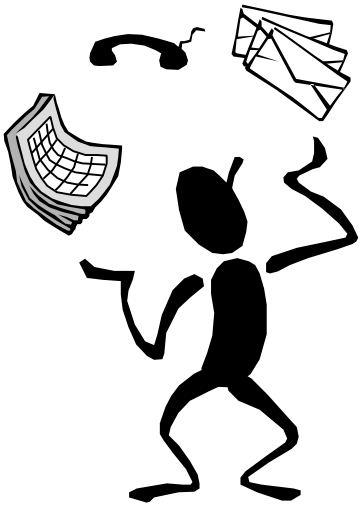
Tel: 613.943.2259
Fax: 613.996.9099
dtolot@nrcan.gc.ca

Thermal Performance of the Exterior Envelopes of Buildings (Thermal VII)

To be held
December 7-11, 1998
Clearwater Beach, FL

For further information:
Mia Prater
Oak Ridge Nat'l Laboratory
Thermal Envelope Conf.
P.O. Box 2008 (Bldg 3147)
Oak Ridge, TN 37831-6070

Tel: 423.576.7942
Fax: 423.574.9331
unb@ornl.gov
http://www.ornl.gov/ORNL/Energy_Eff/tectrans.html



11th Symposium on Improving Building Systems in Hot and Humid Climates

To be held
June 1-2, 1998
Fort Worth, TX

For further information:
Ms. Dawna Rosenkranz
TexasA&M University
Tel: 409.862.8950
Fax: 409.862.8687
drosen@esl.tamu.edu

ASHRAE Annual Meeting

To be held
June 20-24, 1998
Toronto, Ontario, Canada

For further information:
ASHRAE Meetings Sections
1791 Tullie Circle NE
Atlanta, GA 30329

Tel: 404.636.8400
Fax: 404.321-5478

NTIS International Cooperating Organizations

NTIS is the central resource for government-sponsored U.S. and world-wide scientific, technical, engineering, and business-related information. It is a self-supporting and covers its operating expenses through product sales. The NTIS has arrangements with cooperating organizations throughout the world to provide information on new and existing products and services, order processing, resolving order-related problems, coordinating and accepting payment in local currency, and clearing orders through the local Custom's office.

National Technical Information Service U.S. Department of Commerce Springfield, VA 22161

AUSTRALIA
Fairfax RESEARCH
Overseas Document Service
Level 25, Darling Park
201 Sussex St.
Sydney 2000, AUSTRALIA
sgoddard@fairfax.com.au
Tel: 61-2 9282-1614
Fax: 61-2 9282-3656

DENMARK
IHS NORDIC
Jægersborg Allé 16
P.O. Box 90
DK-2920 Charlottenlund
DENMARK
100442.212@compuserve.com
Tel: 45-39 643 288
Fax: 45-39 645 288

ENGLAND
Microinfo Limited
P.O. Box 3
Omega Park
Alton, Hants GU34 2PG
ENGLAND
ntis@ukminfo.demon.co.uk
Tel: 44-1420-86 848
Fax: 44-1420-89 889
www.microinfo.co.uk/

FINLAND
VTT Information Service
P.O. Box 2000
Fin-02044 VTT
FINLAND
(order taking): inf@vtt.fi
Tel: 358-9 456-4430
Fax: 358-9 456-4374
http://www.vtt.fi/inf/

FRANCE
Books & Research
8, rue Gracieuse
75005 Paris, FRANCE
books&r@transea.fr
Tel: 43-36-33-31
Fax: 43-36-44-45
http://www.books-and-research.com

World Data
Mr. Boris Prassoloff
10 Rue Nicolas Flamel
75004 Paris, FRANCE
Tel: 33-1 4278-0578
Fax: 33-1 4278-1472

GERMANY
FIZ Karlsruhe
Bibliographic Service/Library
D-76344 Eggenstein-Leopoldshafen,
GERMANY
library@fiz-karlsruhe.de
Tel: 49-7247 808-333
Fax: 49-7247 808-135
http://www.fiz-karlsruhe.de

INDIA
Allied Publishers Limited
NTIS Division
751 Mount Road
Madras 600 002, INDIA
Tel: 91-44 8523938/3958
Fax: 91-44-8520649

Higginbothams Ltd.
NTIS Division
814, Anna Salai
Madras 600 002, INDIA
Tel: 91-44 852-1841/3
Fax: 91-44 852-8101

INFORMATICS (India) PVT LTD
NTIS Division
No. 337, 3rd Floor, "Karuna Complex"
Sampige Road, Malleswaram
Bangalore 560 003, INDIA
INFO.BNG@IIPL.sprintrpg.sprint.com
Tel: 91-80 367867
Fax: 91-80 3344598

ISRAEL
Teldan Information Systems Ltd.
Mr. Asher Sofrin, Manager
7 Derech Hashalom
Tel Aviv 67892, ISRAEL
teldan@netvision.net.il
Tel: 972-3 695-0073
Fax: 972-3 695-6359
http://teldan.com

ITALY
Diffusione Edizioni Anglo-Americane
Librerie Internazionali
Ms. Bianca Ligi
28 Via Lima
00198 Rome, ITALY
deanet@deanet.it
Tel: 39-6 855-1441
Fax: 39-6 854-3228
http://www.deanet.com

JAPAN
MRI Information Network Inc.
MRI Bldg.
3-6, Otemachi 2-Chome
Chiyoda-Ku, Tokyo 100, JAPAN
LDI03246@niftyserve.or.jp
Tel: 81-3 3277-0794
Fax: 81-3 3277-3486

KOREA
KIITI
Information Resources Dept
P.O. Box 205
Cheongryangri, Seoul, KOREA
Tel: 82-2 962-6211/8
Fax: 82-2 962-4702

THE NETHERLANDS
Bibliotheek TU Delft
P.O. Box 98
2600 MG Delft
THE NETHERLANDS
Info@library.tudelft.nl
Tel: 31-15 278-5940
Fax: 31-15 215-9007

SPAIN
INFILE
Don Ramon de la Cruz, 101- 4 B
28006 Madrid, SPAIN
Tel: 34-1-402-3236/8473
Fax: 34-1-402-4819

SWEDEN
Studsvik Library
Mr. Sten Wesslen
S-611-82 Nykoping, SWEDEN
STUBIB@LIB.KTH.SE
Tel: 46-155 221-000
Fax: 46-155 263-044

TAIWAN
Science & Technology Info Center
National Science Council
14-16F, No. 106,
Ho-Ping East Rd, Sec. 2
Taipei (10636)
TAIWAN, ROC
mei@mailsrv.st.stic.gov.tw
Tel: 886-2 737-7649
Fax: 886-2 737-7664

DOE-2 PROGRAM DOCUMENTATION

DOE-2 documentation is available from two sources.

- The National Technical Information Service offers a complete set of DOE-2 manuals, available for purchase separately; prices and ordering information are below.
- The Energy Science Technology Software Center at Oak Ridge, TN, offers the DOE-2.1E updated documentation (which includes the *Supplement, Sample Run Book,* and *BDL Summary)* free of charge when you purchase the mainframe or workstation version of DOE-2. See the "DOE-2 Directory of Program Related Software and Services" in this issue for ESTSC's address.

Also, many of the PC vendors of DOE-2 offer some or all of the documentation when you buy their program. Names and addresses of all DOE-2 vendors are found in the "DOE-2 Directory of Program Related Software and Services" in this issue.

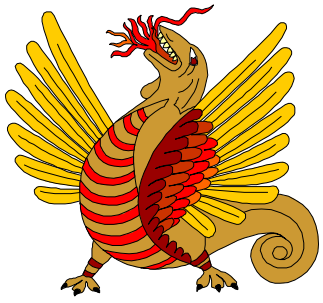
To order any or all of the DOE-2 manuals from the National Technical Information Service:
National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161
Phone (703) 487-4650, FAX (703) 321-8547, http://www.fedworld.gov/ntis/home.html

Document Name	Order Number	Domestic Prices	Foreign Prices
DOE-2 Basics Manual (2.1E)	DE-940-13165	49.00	You may either order documentation through NTIS in Virginia (and pay double the domestic prices) or purchase program manuals though the NTIS International Cooperating organizations, shown on the previous page and save on postage.
BDL Summary (2.1E)	DE-940-11217	28.00	
Sample Run Book (2.1E)	DE-940-11216	100.00	
Reference Manual (2.1A)	LBL-8706, Rev.2	174.00	
Supplement (2.1E)	DE-940-11218	100.00	
Engineers Manual (2.1A)	DE-830-04575	57.00	
[algorithm descriptions]		Current 12/01/97	

LAWRENCE BERKELEY NATIONAL LABORATORY
Simulation Research Group MS: 90-3147
University of California
Berkeley, CA 94720 U.S.A.

ADDRESS CORRECTION REQUESTED

First Class
U.S. POSTAGE PAID
Berkeley, CA
Permit No. 1123



Recycle or Else!